LITERACY IN SCIENCE AND TECHNICAL SUBJECTS

Guiding Principle: *Students develop discipline-specific reading and writing skills. Within the content areas of Science and Technical Subjects, students apply these skills in order to develop a deeper understanding of the content area.*

There are six key areas found in the Literacy in Science and Technical Subjects section for grades 6-12: Key Ideas and Textual Support, Structural Elements and Organization, Synthesis and Connection of Ideas, Writing Genres, the Writing Process, and the Research Process. By demonstrating the skills listed in each section, students should be able to meet the Learning Outcome for Literacy in Science and Technical Subjects.

Note that the standards in this section are not designed for implementation in an English/Language Arts classroom. Instead, they provide guidance to content-area teachers in grades 6-12 (e.g., History/ Social Studies teachers, Science teachers, Career and Technical Education teachers, etc.) on expectations for integrating reading and writing skills into their classrooms.

In Literacy in Science and Technical Subjects, students are expected to do the following:

LEARNING OUTCOMES	LST.1: LEARNING OUTCOME FOR LITERACY IN SCIENCE/TECHNICAL SUBJECTS Read and comprehend science and technical texts independently and proficiently and write effectively for a variety of discipline-specific tasks, purposes, and audiences		
	Indiana Academic Standards		Content Connector
	GRADES 6-8	**6-8.LST.1.1:** Read and comprehend science and technical texts within a range of complexity appropriate for grades 6-8 independently and proficiently by the end of grade 8.	**6-8.LST.1.1.a:** Read and comprehend science and technical texts within a range of complexity appropriate for grades 6-8 independently and proficiently by the end of grade 8.
		6-8.LST.1.2: Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.	**6-8.LST.1.2.a:** Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.
	GRADES 9-10	**9-10.LST.1.1:** Read and comprehend science and technical texts within a range of complexity appropriate for grades 9-10 independently and proficiently by the end of grade 10.	**9-10.LST.1.1.a:** Read and comprehend science and technical texts within a range of complexity appropriate for grades 9-10 independently and proficiently by the end of grade 10.
		9-10.LST.1.2: Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.	**9-10.LST.1.2.a:** Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.
	GRADES 11-12	**11-12.LST.1.1:** Read and comprehend science and	**11-12.LST.1.1.a:** Read and comprehend science and technical

		technical texts within a range of complexity appropriate for grades 11-CCR independently and proficiently by the end of grade 12.	texts within a range of complexity appropriate for grades 11-CCR independently and proficiently by the end of grade 12.
		11-12.LST.1.2: Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.	**11-12.LST.1.2.a:** Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.

KEY IDEAS AND TEXTUAL SUPPORT	**LST.2: KEY IDEAS AND TEXTUAL SUPPORT (READING)** **Extract and construct meaning from science and technical texts using a variety of comprehension skills**		
	Indiana Academic Standards		**Content Connector**
	GRADES 6-8	**6-8.LST.2.1:** Cite specific textual evidence to support analysis of science and technical texts.	**6-8.LST.2.1.a:** Cite specific textual evidence to support analysis of science and technical texts.
		6-8.LST.2.2: Determine the central ideas or conclusions of a text; provide an accurate, objective summary of the text.	**6-8.LST.2.2.a:** Determine the central ideas or conclusions of a text; provide an accurate, objective summary of the text.
		6-8.LST.2.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	**6-8.LST.2.3.a:** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
	GRADES 9-10	**9-10.LST.2.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	**9-10.LST.2.1.a:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
		9-10.LST.2.2: Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate, objective summary of the text.	**9-10.LST.2.2.a:** Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate, objective summary of the text.
		9-10.LST.2.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	**9-10.LST.2.3.a:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
	GRADES 11-12	**11-12.LST.2.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.	**11-12.LST.2.1.a:** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
		11-12.LST.2.2: Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.	**11-12.LST.2.2.a:** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
		11-12.LST.2.3: Follow precisely a complex multistep	**11-12.LST.2.3.a:** Follow precisely a complex multistep

		procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.	procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

STRUCTURAL ELEMENTS AND ORGANIZATION	LST.3: STRUCTURAL ELEMENTS AND ORGANIZATION (READING) **Build understanding of science and technical texts, using knowledge of structural organization and author's purpose and message**		
	Indiana Academic Standards		**Content Connector**
	GRADES 6-8	**6-8.LST.3.1:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.	**6-8.LST.3.1.a:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
		6-8.LST.3.2: Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.	**6-8.LST.3.2.a:** Describe the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
		6-8.LST.3.3: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	**6-8.LST.3.3.a:** Describe the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
	GRADES 9-10	**9-10.LST.3.1:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.	**9-10.LST.3.1.a:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
		9-10.LST.3.2: Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).	**9-10.LST.3.2.a:** Describe the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).
		9-10.LST.3.3: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	**9-10.LST.3.3.a:** Describe the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
	GRADES 11-12	**11-12.LST.3.1:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.	**11-12.LST.3.1.a:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
		11-12.LST.3.2: Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	**11-12.LST.3.2.a:** Describe how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
		11-12.LST.3.3: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	**11-12.LST.3.3.a:** Describe the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

SYNTHESIS AND CONNECTION OF IDEAS	LST.4: SYNTHESIS AND CONNECTION OF IDEAS (READING) **Build understanding of science and technical texts by synthesizing and connecting ideas and evaluating specific claims**		
	Indiana Academic Standards		**Content Connector**
	GRADES 6-8	**6-8.LST.4.1:** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., *in a flowchart, diagram, model, graph, or table*).	**6-8.LST.4.1.a:** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., *in a flowchart, diagram, model, graph, or table*).
		6-8.LST.4.2: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	**6-8.LST.4.2.a:** Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
		6-8.LST.4.3: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	**6-8.LST.4.3.a:** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
	GRADES 9-10	**9-10.LST.4.1:** Translate quantitative or technical information expressed in words in a text into visual form (e.g., *a table or chart*) and translate information expressed visually or mathematically (e.g., *in an equation*) into words.	**9-10.LST.4.1.a:** Translate quantitative or technical information expressed in words in a text into visual form (e.g., *a table or chart*) and translate information expressed visually or mathematically (e.g., *in an equation*) into words.
		9-10.LST.4.2: Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	**9-10.LST.4.2.a:** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
		9-10.LST.4.3: Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	**9-10.LST.4.3.a:** Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
	GRADES 11-12	**11-12.LST.4.1:** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., *quantitative data, video, multimedia*) in order to address a question or solve a problem.	**11-12.LST.4.1.a:** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., *quantitative data, video, multimedia*) in order to address a question or solve a problem.
		11-12.LST.4.2: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.	**11-12.LST.4.2.a:** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
		11-12.LST.4.3: Synthesize information from a range of sources (e.g., *texts, experiments, simulations*) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	**11-12.LST.4.3.a:** Draw conclusions from a range of sources (e.g., *texts, experiments, simulations*) to develop a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

WRITING GENRES	LH.5: WRITING GENRES (WRITING) Write for different purposes and to specific audiences or people		
	Indiana Academic Standards		Content Connector
	GRADES 6-8	**6-8.LST.5.1:** Write arguments focused on discipline-specific content.	**6-8.LST.5.1.a:** Write arguments focused on discipline-specific content.
		6-8.LST.5.2: Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.	**6-8.LST.5.2.a:** Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.
	GRADES 9-10	**9-10.LST.5.1:** Write arguments focused on discipline-specific content.	**9-10.LST.5.1.a:** Write arguments focused on discipline-specific content.
		9-10.LST.5.2: Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.	**9-10.LST.5.2.a:** Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.
	GRADES 11-12	**11-12.LST.5.1:** Write arguments focused on discipline-specific content.	**11-12.LST.5.1.a:** Write arguments focused on discipline-specific content.
		11-12.LST.5.2: Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.	**11-12.LST.5.2.a:** Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.

THE WRITING PROCESS	LST.6: THE WRITING PROCESS (WRITING) **Produce coherent and legible documents by planning, drafting, revising, editing, and collaborating with others**		
		Indiana Academic Standards	**Content Connector**
	GRADES 6-8	**6-8.LST.6.1:** Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach; and edit to produce and strengthen writing that is clear and coherent, with some guidance and support from peers and adults.	**6-8.LST.6.1.a:** Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach; and edit to produce and strengthen writing that is clear and coherent, with some guidance and support from peers and adults.
		6-8.LST.6.2: Use technology to produce and publish writing and present the relationships between information and ideas clearly and efficiently.	**6-8.LST.6.2.a:** Use technology to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
	GRADES 9-10	**9-10.LST.6.1:** Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach, focusing on addressing what is most significant for a specific purpose and audience; and edit to produce and strengthen writing that is clear and coherent.	**9-10.LST.6.1.a:** Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach, focusing on addressing what is most significant for a specific purpose and audience; and edit to produce and strengthen writing that is clear and coherent.
		9-10.LST.6.2: Use technology to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	**9-10.LST.6.2.a:** Use technology to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
	GRADES 11-12	**11-12.LST.6.1:** Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach, focusing on addressing what is most significant for a specific purpose and audience; and edit to produce and strengthen writing that is clear and coherent.	**11-12.LST.6.1.a:** Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach, focusing on addressing what is most significant for a specific purpose and audience; and edit to produce and strengthen writing that is clear and coherent.
		11-12.LST.6.2: Use technology to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	**11-12.LST.6.2.a:** Use technology to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

THE RESEARCH PROCESS	LST.7: THE RESEARCH PROCESS (WRITING) **Build knowledge about the research process and the topic under study by conducting short or more sustained research**		
	Indiana Academic Standards		**Content Connector**
	GRADES 6-8	**6-8.LST.7.1:** Conduct short research assignments and tasks to answer a question (including a self- generated question), or test a hypothesis, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	**6-8.LST.7.1.a:** Conduct short research assignments and tasks to answer a question (including a self- generated question), or test a hypothesis, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
		6-8.LST.7.2: Gather relevant information from multiple sources, using search terms effectively; annotate sources; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation (e.g., *APA or CSE*).	**6-8.LST.7.2.a:** Gather relevant information from multiple sources, using search terms effectively; annotate sources; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation (e.g., *APA or CSE*).
		6-8.LST.7.3: Draw evidence from informational texts to support analysis, reflection, and research.	**6-8.LST.7.3.a:** Draw evidence from informational texts to support analysis, reflection, and research.
	GRADES 9-10	**9-10.LST.7.1:** Conduct short as well as more sustained research assignments and tasks to answer a question (including a self-generated question), test a hypothesis, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	**9-10.LST.7.1.a:** Conduct short as well as more sustained research assignments and tasks to answer a question (including a self-generated question), test a hypothesis, or solve a problem; narrow or broaden the inquiry when appropriate; cite evidence from multiple sources on the subject, demonstrating understanding of the subject under investigation.
		9-10.LST.7.2: Gather relevant information from multiple authoritative sources, using advanced searches effectively; annotate sources; assess the usefulness of each source in answering the research question; synthesize and integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (e.g., *APA or CSE*).	**9-10.LST.7.2.a:** Gather relevant information from multiple authoritative sources, using advanced searches effectively; annotate sources; assess the usefulness of each source in answering the research question; interpret and integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (e.g., *APA or CSE*).
		9-10.LST.7.3: Draw evidence from informational texts to support analysis, reflection, and research.	**9-10.LST.7.3.a:** Draw evidence from informational texts to support analysis, reflection, and research.
	GRADES 11-12	**11-12.LST.7.1:** Conduct short as well as more sustained research assignments and tasks to answer a question (including a self-generated question), test a hypothesis, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	**11-12.LST.7.1.a:** Conduct short as well as more sustained research assignments and tasks to answer a question (including a self-generated question), test a hypothesis, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

		11-12.LST.7.2: Gather relevant information from multiple types of authoritative sources, using advanced searches effectively; annotate sources; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; synthesize and integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (e.g., *APA or CSE*).	**11-12.LST.7.2.a:** Gather relevant information from multiple types of authoritative sources, using advanced searches effectively; annotate sources; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; synthesize and integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (e.g., *APA or CSE*).
		11-12.LST.7.3: Draw evidence from informational texts to support analysis, reflection, and research.	**11-12.LST.7.3.a:** Draw evidence from informational texts to support analysis, reflection, and research.